

IN THE CLAIMS

Please cancel claim 2 without prejudice. Claim 41 is new.

Please amend the following claims which are pending in the present application:

1. (Currently amended) A microelectronic assembly, comprising:
a die substrate;
an integrated circuit formed on the die substrate, the die substrate and integrated circuit jointly forming a die; and
a plurality of thermoelectric elements formed on a side of the die, with the integrated circuit between the die substrate and the thermoelectric elements so as to pump heat away from the die when current flows through the thermoelectric elements.
2. (Cancelled)
3. (Currently amended) The microelectronic assembly of claim [[2]] 1, wherein the integrated circuit includes a power plane connected to the thermoelectric ~~components~~ elements, such that power is provided through the thermoelectric ~~components~~ elements to the power plane.
4. (Currently amended) The microelectronic assembly of claim 3, further comprising a power conductive interconnection element formed on each

thermoelectric ~~component~~ element.

5. (Original) The microelectronic assembly of claim 4, further comprising a plurality of ground and signal conductive interconnection elements having contact surfaces in a plane of contact surfaces of the power conductive interconnection elements.

6. (Original) The microelectronic assembly of claim 5, further comprising a carrier substrate and a plurality of carrier substrate lands on the carrier substrate, each conductive interconnection element being located against a respective carrier substrate land.

7. (Currently amended) The microelectronic assembly of claim [[2]] 1, further comprising a dielectric material surrounding the thermoelectric elements.

8. (Currently amended) The microelectronic assembly of claim [[2]] 1, wherein the thermoelectric ~~components~~ elements are in pairs, each pair including a respective thermoelectric ~~component~~ element that is p-doped and a respective thermoelectric ~~component~~ element that is n-doped, further comprising a plurality of link elements formed on the die, each link element interconnecting two ~~interconnection~~ thermoelectric elements of a respective pair.

9. (Currently amended) The microelectronic assembly of claim 1, wherein the thermoelectric elements are formed on a side of the die, with the integrated circuit between the die substrate and the thermoelectric elements, further comprising a dielectric material surrounding the thermoelectric elements, and wherein the integrated circuit includes a power plane connected to the thermoelectric ~~components~~ elements such that power is provided through the thermoelectric ~~components~~ elements to the power plane.
10. (Currently amended) The microelectronic assembly of claim 8, further comprising a carrier substrate and a plurality of carrier substrate lands on the carrier substrate, each ~~conductive-interconnection~~ link element being located against a respective carrier substrate land.
11. (Currently amended) The microelectronic assembly of claim ~~[[1]]~~ 41, wherein the thermoelectric elements are formed on a side of the die, with the die substrate between the integrated circuit and the thermoelectric elements.
12. (Original) The microelectronic assembly of claim 11, further comprising a dielectric material surrounding the thermoelectric elements.
13. (Currently amended) The microelectronic assembly of claim 11, wherein the thermoelectric ~~components~~ elements are in pairs, each pair including a

respective thermoelectric ~~component~~ element that is p-doped and a respective thermoelectric ~~component~~ element that is n-doped, further comprising a plurality of link elements formed on the die, each link element interconnecting two interconnection elements of a respective pair.

14. (Original) The microelectronic assembly of claim 11, further comprising a carrier substrate, the die being mounted to the carrier substrate and the thermoelectric elements being electrically connected to the carrier substrate to receive power from the carrier substrate.

15. (Original) The microelectronic assembly of claim 14, further comprising a plurality of carrier substrate lands on the carrier substrate, a plurality of thermoelectric lands connected to the thermoelectric elements, and a plurality of wirebonding wires, each having one portion attached to a respective carrier substrate land and another portion attached to a respective thermoelectric land.

16. (Original) The microelectronic assembly of claim 15, wherein the thermoelectric lands are formed on the die substrate.

17. (Original) The microelectronic assembly of claim 16, further comprising a plurality of conductive interconnection elements attached to the die on a side thereof with the integrated circuit between the conductive interconnection

elements and the die substrate, each conductive interconnection element being in contact with a respective one of the carrier substrate lands.

18. (Original) The microelectronic assembly of claim 11, further comprising a plurality of conductive interconnection elements attached to the die on a side thereof with the integrated circuit between the conductive interconnection elements and the die substrate, each conductive interconnection element being in contact with a respective one of the carrier substrate lands.

19. (Original) The microelectronic assembly of claim 18, further comprising a plurality of thermoelectric vias in the die, a first plurality of the conductive interconnection elements connecting the integrated circuit with a first plurality of the carrier substrate lands and a second plurality of the conductive interconnection elements being connected through the thermoelectric vias to the thermoelectric elements.

20. (Currently amended) The microelectronic assembly of claim 19, wherein at least one of the thermoelectric elements is aligned with one of the thermoelectric vias and one of the conductive interconnection[[s]] elements.

21. (Original) The microelectronic assembly of claim 1, further comprising a plurality of die lands on the die, a plurality of first diffusion barrier layers, each

on a respective die land, each thermoelectric element being formed on a respective diffusion barrier layer.

22. (Original) The microelectronic assembly of claim 21, further comprising at least one second diffusion barrier layer on at least one of the thermoelectric elements, with the respective thermoelectric element between a respective one of the first diffusion barrier layers and the second diffusion barrier layer.

23. (Original) The microelectronic assembly of claim 21, wherein the thermoelectric elements are formed on a side of the die, with the integrated circuit between the die substrate and the thermoelectric elements.

24. (Original) The microelectronic assembly of claim 22, wherein the thermoelectric elements are formed on a side of the die, with the die substrate between the integrated circuit and the thermoelectric elements.

25. (Original) The microelectronic assembly of claim 24, further comprising a carrier substrate, the die being mounted to the carrier substrate and the thermoelectric elements being electrically connected to the carrier substrate to receive power from the carrier substrate.

26. (Original) The microelectronic assembly of claim 1, further comprising a

thermally conductive plate thermally coupled to the thermoelectric elements, with the thermoelectric elements between the die and the thermally conductive plate.

27. (Original) The microelectronic assembly of claim 26, further comprising a plurality of fins extending from the thermally conductive plate from which heat, conducting from the thermally conductive plate, convects to surrounding air.

28-40. (Cancelled)

41. (New) A microelectronic assembly, comprising:

a die substrate;

an integrated circuit formed on the die substrate, the die substrate and integrated circuit jointly forming a die;

a plurality of thermoelectric elements formed on the die so as to pump heat away from the die when current flows through the thermoelectric elements; and

a dielectric material surrounding the thermoelectric elements.